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AUTHOR Klinzing, Hans Gerhard; Klinzing-Eurich, Gisela
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ABSTRACT

A Minicourse on Flanders' Interaction Analysis was adapted and re-developed for use in West German teacher training institutions, and evaluated in several studies with pre- and inservice teachers. The Minicourse incorporates the microteaching components of discrimination training, laboratory teaching experience, and feedback. The results of four sets of studies show that teachers can be trained to code classroom events using Flanders' Interaction Analysis System in a relatively short time, but that this discrimination training is only a first step and not effective when aiming at actually changing classroom behavior. For this purpose additional laboratory experience including extended feedback proves to be more promising. (Author/JD)

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Hans Gerhard Klinzing
Gisela Klinzing-Eurich

Teacher Training for Interactive Teaching

Paper presented at the annual meeting of the American Educational Research Association. Los Angeles April 1981

Universitaet Tuebingen
Institut fuer Erziehungswissenschaft II
Zentrum fuer neue Lernverfahren
Muenzgasse 11
D-7400 Tuebingen
W.Germany

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A B S T R A C T

A Minicourse on Flanders' Interaction Analysis, a teacher training package originally developed by the Far West Laboratory for Educational Research and Development, was adapted and re-developed for the use in the Western German teacher training system, and evaluated in several studies with pre- and inservice teachers. The Minicourse incorporates the Microteaching components of discrimination training, laboratory teaching experience, and feedback.

Results show that teachers can be trained to code classroom events using Flanders' Interaction Analysis System in a relatively short time, but that this discrimination training is only a first step and not effective when aiming at actually changing classroom behavior. For this purpose additional laboratory experience including extended feedback proves to be more promising.

running head: teacher training

B A C K G R O U N D

Research on teacher education has shown that conventional teacher training programs with "frequently lengthy stays in the semantic stratosphere" (Peck and Tucker 1973, p.970) and on-the-job training teaching experience are not sufficient in developing desired teaching skills.

In examining American monographs, journal articles, and AERA papers from the mid 1960's to the early 1970's, we found a strong interest in the approach, design, and effects of systematic teacher training. In the last decade, however, we have observed a decline of interest in this area. Not so in Europe. Increasing dissatisfaction with non-systematic teacher trainings has prompted researchers in Great Britain and West Germany to concentrate on research and development of effective individualized teacher training methods and programs. Similar projects are also underway in Sweden, the Netherlands, Hungary, and other European countries (Van Houten, 1975; Klinzing-Eurich and Klinzing, 1981).

The work described here represents one of our projects at the Center for New Learning Methods at the University of Tuebingen. This work involved the adaptation and re-development of teacher training methods and self-contained packages. The particular project reported here is four sets of small-scale studies based on the German adaptation of Minicourse 4 "Interaction Analysis" developed in 1972 at the Far West Laboratory for Educational Research and Development in San Francisco, Calif.(1).

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(1) Minicourse 4: Interaction Analysis. Far West Laboratory for Educational Research and Development (Berkeley, Cal.). Developed by E. Werner, R.A. Elder, J. Newman, M. Lai, J. Harano, D. Walton, P. Barron, in consultation with N.A.Flanders. San Francisco, Calif., 1972.

The studies were conducted in Microteaching clinics for pre- and inservice teachers at the University of Tuebingen and at teacher training institutions in different areas of West Germany.

This self-instructional training package is based on three components which have been well-established by research:

- observer training/discrimination training (Orme, 1966; Claus, 1969; Young, 1969; Amidon and Hough, 1967; Flanders, 1970; Wagner, 1973; Veenman et al., 1974; Borg and Stone, 1974; Peck and Tucker, 1973)

- carefully-designed laboratory situations for the practice of specific teaching and decision-making skills (Allen and Ryan, 1969; Borg et al., 1970; B.O. Smith, 21970; Shavelson, 1976; Gage and Berliner, 1979; Cruickshank, 1980; Zifreund, 1966, 1968, 1970, 1976)

- feedback by videotape or audiotape in combination with self-evaluation and peer-group discussion (Fuller and Manning, 1973; Peck and Tucker, 1973).

Description of Minicourse 4: "Interaction Analysis"

"Flanders's Interaction System is a concise set of dimensions for describing the way a teacher interacts with his class. The dimensions contain a strong emphasis on affective elements of the classroom atmosphere, although cognitive issues are also represented. When used as a training device to give feedback to teachers about their observable patterns of action, the system has a very explicit set of objectives. Its intent is to get teachers to maximize the frequency with which they foster more self-starting, self-directed, actively inquiring patterns of learning behavior in their pupils." (Peck and Tucker, p.947)

The Minicourse training package consists of a teacher handbook, audiotapes, and an answer book. The course is organized into five self-instructional lessons. Lesson 1 introduces the Flanders Interaction Analysis (IA) categories in a programmed format and trains the teachers to code classroom interaction at a practical level of accuracy. Exercises based on written transcripts and audiotapes of classroom interaction provide practice in coding verbal classroom behavior. The answer book gives the trainee the opportunity to check the accuracy of his or her coding. Lessons 2 to 5 are concerned with the training of behavioral skills related to the IA categories.

Table 1 provides a list of objectives for the five lessons.

The organization of the training segments in lessons 2 to 5 is similar. After introductory remarks, the objectives, procedures, and the specific activities of the lesson are presented. This is followed by a detailed description of the individual teaching skills illustrated by examples. Instructions for the coding and interpretation of the respective categories, some written exercises, audiotape exercises, and suggestions for the evaluation of the coded interaction complete the presentation. Reading a lesson and preparing the written

TABLE 1

LESSON OBJECTIVES OF INTERACTION ANALYSIS

Lesson One:	Learning to Use Flanders' Interaction Analysis Categories (FIAC)
Objective:	To acquire proficiency in using Flanders' categories of interaction analysis to code classroom interaction from audiotape at a regular rate and at a practical level of accuracy.
Lesson Two:	Teacher Initiation and Teacher Response
Objectives:	To acquire proficiency in interpreting coded timelines of one's own classroom interaction to analyze the effect of one's teaching on students, especially the effects of teacher initiation and teacher response.
	To increase use of broad rather than narrow questions when attempting to invite student initiation.
Lesson Three:	"Because Extensions" and Effective Criticism
Objectives:	To increase use of "because extensions" when praising or encouraging, giving directions, and criticizing or justifying authority. (Categories 2, 6, and 7 of FIAC.)
	To increase use of accepting feelings, praising or encouraging, and accepting or using student ideas in conjunction with criticizing behavior. (Categories 1, 2, and 3 in conjunction with 7.)
Lesson Four:	Accepting and Using Student Ideas and Feelings
Objectives:	To increase frequency of accepting and using ideas of students. (Category 3 behaviors subscripted.)
	To increase acceptance of student feelings. (Category 1 of FIAC.)
Lesson Five:	Self-directed Inquiry into the Effects of Teaching Behavior on Student Behavior
Objective:	Using skills learned in the first four lessons, to acquire proficiency in selecting teaching behaviors to bring about desired changes in student behavior.

(From: Minicourse 4 : Interaction Analysis. FWLERD 1973).

exercises requires 1 - 2 hours. Another 2 - 3 hours are needed for the audiotape exercises and their evaluation, including the comparison of the individual's results with those in the answer book and the interpretation of the data. In addition, each lesson provides one Microteaching cycle (3 - 4 hours) consisting of: a 10 - 15 minute teaching session with 4 - 6 pupils or a regular class; feedback based on the IA system and a reteach under comparable conditions. In a number of cases, the participants repeat steps (e.g. the audiotape exercises or the coding of their own teaching sessions). So the actual training requires a total of 50 - 70 hours.

PURPOSE OF STUDIES

The main questions to be answered were:

1.) Does the IA training provided in Lesson 1 of Minicourse 4 lead to an accuracy in coding which is sufficient for teacher training purposes? How much time does this require?

2.) Does the training in IA coding provided by Lesson 1 of Minicourse 4 lead to changes in teacher behavior?

3.) Does training in IA coding and one Microteaching cycle (consisting of teach and reteach) lead to more change in teacher behavior than training in IA coding alone?

4.) Does extended Microteaching training (training in coding and four Microteaching cycles) lead to more change in teacher behavior than either training in IA coding alone or supplemented by one Microteaching cycle?

5.) How do student teachers evaluate the training provided by the Minicourse?

THE FIRST SET OF STUDIES

The purpose of this set of studies was to determine whether the training in IA coding provided by Lesson 1 of the Minicourse leads to coding proficiency sufficiently accurate for teacher training.

Method

The researchers had the opportunity to work with nine groups. These nine different samples of trainees completed Lesson 1 of Minicourse 4 at different times over a period of three years.

The samples are described in table 2.

This typically required 6 hours. In some samples this IA training was done individually, in others in groups of 2 - 5 colleagues.

Data source

After completing Lesson 1 of Minicourse 4, the participants were asked to code two videotapes of regular school lessons using the ten IA categories. The first videotape was 7 minutes in length, and the second was 12 minutes. Some groups of trainees viewed their test tapes before coding, others did not (see table 2). Each participant's accuracy in coding the two lessons was determined by computing a modified Scott-coefficient of reliability (Flanders, 1967) between the participant's coding and an expert's criterion coding.

Results

Table 2 shows the medians of the Scott-coeffient (and where comparisons were made U-test results) for the evaluation of the 9 groups.

The results show that accurate coding of classroom interaction can be learned in a relatively short period of time (about 6 hours).

TABLE 2

Coding Ability of Nine Different Groups

Mean Scott-Coefficient of Reliability Between Participants' Coding and an Expert's Criterion Coding

Group no.	participants, working and testing conditions	video-tape	N	Med.	comments
1	university students of various subject areas without teaching experience, individual work (4-7 hours)	I II	11	0.52 0.66	
2	(same as 1)	I II	11	0.53 0.66	
3	elementary school teacher candidates with some teaching experience, individual work (4-7 hours)	I II	11	0.67 0.74	
4	experienced teachers of social workers , individual work (4-7 hours)	I II	12	0.66 0.75	
5	university students as in no.1 and 2 after having viewed the test tapes once	I II	24	0.73 0.77	
6	elementary school teacher candidates as in no.3 after having viewed the test tapes once	I II	7	0.80 0.76	
7	university students without teaching experience				group 7 was randomly divided into groups 7a and 7b
	a.) individual work	I II	8	0.68 0.71	
	b.) group work	I II	9	0.60 0.71	in test I there is a low sign. ($p \neq 0.10$) difference between the groups (U-test)
8	secondary school teacher candidates of various subject matters with approximately one half year's teaching experience. They were randomly assigned to:				group 8 was randomly divided into groups 8a and 8b
	a.) working with the material individually ($\bar{x}$=5:15hrs)	I II	12	0.63 0.76	No sign.diff. (U-test)
	b.) working with the material in groups ($\bar{x}$=6:30hrs)	I II	12	0.67 0.77	
9	university students of various subject areas as in no. 1 and 2. Participants chose between:				participants chose between individual or grp. work
	a.) working with the material individually ($\bar{x}$=5 hrs)	I II	12	0.52 0.69	
	b.) working with the material in groups ($\bar{x}$=5:45hrs)	I II	1o	0.51 0.57	No sign. diff. (U-test)

The medians of the Scott coefficients for the nine groups in coding the first videotape range from 0.51 to 0.80, the medians in coding the second videotape range from 0.57 to 0.77. This is a satisfactory reliability because the interaction patterns changed rapidly, making it difficult even for an experienced observer to code the shifts in categories.

The training package can be used effectively when working individually as well as in groups. Working in groups requires more time however (groups 7, 8, 9), and tends to be slightly less successful. The comparison of the results of groups 1 and 5 with those of groups 6 and 3 shows that there is a strong increase in coding accuracy when each tape is shown twice. The differences in results between participants with no teaching experience (1, 2, 7, 9) and groups with considerable or at least some teaching experience are significant (U-test, $p \leq 0.01$). A tendency to achieve a greater accuracy in coding can be observed with teachers having prior teaching experience (groups 3, 4 and 8). Flanders (1967) reached the same conclusion based on his informal studies of teachers' coding behavior.

THE SECOND SET OF STUDIES

Two studies with Lesson 1 of the Minicourse were conducted to determine the effect of training in IA coding on teacher behavior.

Study 1

Method

A pretest posttest control group design was used in this study. Twenty-four student teachers from different subject areas were randomly assigned to an experimental (n=12) and a control group

(n=10)(1). Both groups taught two 10-15 minute pretest and two posttest Microteaching lessons to 5 - 6 peers. The teachers' main goal in the first lesson, labelled "Teacher Initiation Lesson" (TIL) was to impart knowledge. The second lesson, labelled "Teacher Response Lesson" (TRL), was a discussion-type lesson in which the teacher's goal was to react constructively to participant-initiated interaction (Lai et al., 1973). The topic was similar in all four lessons. After the pretest, each participant in both groups viewed his or her tape individually. Then the experimental group received training in IA coding as provided in Lesson 1 of Minicourse 4, and an introduction to the interpretation of Flanders Interaction Analysis data based on the timeline display, the 10 x 10 matrix, and Flanders ratios, as described in the appendix (Flanders 1970). This training required 1 1/2 days. The control group received no training.

Data source

Two trained observers coded the first 10 minutes of each pretest and posttest of the experimental group and the control group. Inter-rater reliability was above 0.85.

Results:

Table 3 summarizes the results for 9 (2) categories and 12 Flanders ratios.

The results for the Teacher Initiation Lesson (TIL) show significant changes desirable according to Flanders' IA system in the categories 3, 5, and the ratios PTR, IDR, and CCR both in the experimental and the control group. In both groups there

(1) The two drop-outs were mainly due to organizational problems of the participants

(2) Category 10 data are not reported here because the researchers defined this category differently than is customary practice.

Table 3

Effects of IA -Training

Means, Wilcoxon- and U-Test Results for 9 IA-Categories and 11 Flanders Ratios

		experimental group(n=12)				control group (n=10)				(1)	
cat./ ratio	Test	TIL M	W-Test p	TRL M	W-Test p	TIL M	W-Test p	TRL M	W-Test p	TIL p	TRL p
1	pre post	0.00 0.00	-	0.00 0.00	-	0.00 0.00	-	0.00 0.00	-	-	-
2	pre post	0.04 0.46	0.05	0.46 0.71	-	0.05 0.25	-	..32 0.20	-	-	-
3	pre post	0.69 5.86	0.02	7.90 10.15	-	2.08 5.34	0.02	7.29 7.17	-	-	-
4	pre post	0.30 2.91	0.02	9.19 7.91	-	1.66 2.16	-	6.49 4.03	-	-	-
5	pre post	90.24 76.03	0.05	27.24 29.37	-	87.02 76.63	0.02	26.94 19.61	-	-	-
6	pre post	0.00 0.29	-	0.08 0.08	-	0.00 0.00	-	0.24 0.09	-	-	-
7	pre post	0.04 0.00	-	0.13 0.08	-	0.00 0.20	-	0.06 0.00	-	-	-
8	pre post	0.08 3.76	0.02	2.31 5.02	-	0.45 2.92	0.05	7.54 0.52	0.02	-	0.02
9	pre post	4.22 5.96	-	48.03 37.80	0.05	2.26 7.74	0.05	42.57 59.29	0.02	-	0.02
TTR	pre post	0.91 0.86	-	0.45 0.48	-	0.91 0.85	-	0.41 0.31	0.02	-	0.05
PTR	pre post	0.04 0.10	0.05	0.50 0.43	-	0.03 0.11	0.02	0.50 0.60	0.02	-	0.02
STR	pre post	0.91 0.80	0.02	0.77 0.67	0.02	0.87 0.79	0.02	0.70 0.69	-	-	-
ITR	pre post	0.01 0.12	0.02	0.41 0.42	-	0.04 0.10	0.02	0.38 0.39	-	-	-
TRR	pre post	0.40 0.79	0.05	0.96 0.98	-	0.50 0.87	-	0.94 0.99	-	-	-
TRR89	pre post	0.40 0.83	0.05	0.96 0.99	-	0.50 0.87	-	0.99 0.99	-	-	-
CCR	pre post	0.94 0.83	0.05	0.41 0.42	-	0.94 0.85	0.02	0.39 0.28	0.05	-	-
TQR	pre post	0.00 0.04	0.02	0.27 0.22	-	0.02 0.03	-	0.24 0.19	-	-	-
TQR89	pre post	0.00 0.18	-	0.29 0.07	0.05	0.10 0.10	-	0.26 0.34	-	-	-
PSER	pre post	0.26 0.23	-	0.79 0.68	0.02	0.17 0.29	-	0.75 0.78	-	-	0.05
PIR	pre post	0.48 0.42	-	0.90 0.86	-	0.51 0.66	-	0.83 0.99	0.02	-	0.02

two-tail test

For the definition of the categories and ratios, see appendix.
TIL = Teacher Initiation Lesson
TRL = Teacher Response Lesson

(1) U-Test to test for the significance between the experimental group and the control group.

were also changes in category 8 and in the SSR. In addition, the experimental group made changes desirable according to the Flanders' system in categories 2 and 4, the TRR, TRR 89, and TQR; changes in category 9 could be observed only in the control group. The comparison of the change rates of the experimental and the control group with the U-test by Mann and Whitney (Hays, 1973) gave no significant results.

In the Teacher Response Lesson (TRL), only the control group demonstrates changes in the desired direction: there is a significant increase in categories 8 and 9, the PTR, and the PIR, and a decrease in the CCR and TTR. The experimental group exhibits an unexpected decrease in category 9, the TQR and PSSR. The comparison of the change rates shows significant results for categories 8, 9, the PTR, TTR, PSSR and the PIR.

The results are disappointing. They indicate that merely Interaction Analysis training results in very little teacher performance differences, even in scaled-down parctice situations such as peer teaching micro-sessions. These results are puzzling: both groups show similar changes though the control group did not receive IA training.

Study 2

These results led to another study on the effects of Lesson 1 of the Minicourse. It was aimed at determining the effects of IA training and self-feedback based on the IA system.

Method

Twenty-four secondary school teachers from different subject areas volunteered for the study. After an introduction to the principles of classroom observation, the IA system and its underlying theory, and the goals and organization of the course

(approximately 2 hours), all participants conducted a TRL pretest with their entire class as described in Study 1. The participants next worked through Lesson 1 of Minicourse 4 and were introduced to various ways of displaying and interpreting IA data: multiple coding of the 10 basic categories, the interpretation of the data based on the time-line display, the 10 x 10 matrix, and the ratios as defined in the appendix (Flanders, 1970). This required a total of eight hours. In addition, they were instructed in these objectives appropriate for classroom discussions:

- reducing teacher talk and increasing pupil talk (TTR, PTR, more and longer student utterances)
- achieving more "indirect teacher behavior (IDR, TRR)
- increasing the frequency of accepting and using student ideas (behaviors of category 3) and sustained use of category 3 behaviors (3-3 cells)
- increasing the frequency of using student ideas (category 3 subscripted) rather than merely accepting them
- increasing pupil initiation (PIR and category 9).

The trainees evaluated their pretest using the basic and subscripted categories to determine how well they were achieving these objectives. Working in dyads or small groups, they developed strategies for achieving the objectives in the posttest. The posttest was conducted under conditions and with topics similar to each participant's pretest, and with the same students.

Data source

Two trained observers coded the first 10 minutes of the pretests and posttests with the expanded FIAC system. Observer reliability was above .80.

Results

The results are summarized in tables 4a and b.

For the definitions of the categories and Flanders ratios, and for the definitions of "units" and "chains" as used for the evaluation, see appendix.

A slight but significant reduction in teacher talk was observed. There also was a significant increase in initiative pupil-pupil interaction (9 X) and silence (cat. 10 S). No other significant changes in teacher or student behavior were observed. With respect to category 3 and its subcategories, results show a decrease in the acceptance and use of student ideas due to a reduction of the use of pupil ideas (cat. 3 and 3U calculated as chains).

Training in IA coding and feedback based on IA had very little effect. However, it is probably much more difficult to implement a teaching behavior appropriately in a "real" classroom than in a peer teaching situation, as was the case in Study 1 of set 2.

THE THIRD SET OF STUDIES

Two studies were conducted to determine whether additional practice and feedback (one Microteaching cycle) would be more successful in changing teacher behavior than interaction analysis only.

Study 1:

Method

Twenty-one student teachers from different areas of study volunteered in this study. The participants were randomly assigned to the experimental group (n=11) and comparison group (n=10). Both groups taught a 10-15 minute pretest microlesson to 5 - 6 peers. They were

Table 4a

Effects of IA Training and Feedback Based on IA in Regular Classrooms

Means and Wilcoxon-Test Results for 10 FIA Categories and 11 Subcategories in Units and Chains, and of Ratio Scores (n=24)(10 minutes)("Teacher Response Lesson")

Cat.	Units			Chains		
	Pre Test M	Post Test M	p	Pre Test M	Post Test M	p
1	0.00	0.08	–	0.00	0.04	–
2	2.50	3.00	0.10	2.42	2.92	–
3A	*15.25*	*13.33*	–	*13.83*	*11.79*	–
3U	*18.04*	*13.88*	–*	*10.08*	*7.33*	*0.005**
3	33.29	27.21	–*	21.21	17.71	0.025*
4O	*5.42*	*5.63*	–	*5.13*	*5.29*	–
4N	*14.96*	*15.08*	–*	*7.96*	*8.04*	–*
4B	*10.88*	*8.96*	–*	*4.46*	*3.83*	–*
4	31.25	29.67	–	17.79	15.42	–
5	35.71	28.04	–	9.46	7.50	–
6	0.96	0.46	–	0.71	0.29	–
7	0.79	0.71	–	0.50	0.58	–
3/	*25.54*	*22.38*	–	*13.71*	*12.83*	–
3X	*0.08*	*0.13*	–	*0.08*	*0.08*	–
8	25.63	22.50	–	13.79	12.92	–
9/	*47.50*	*56.71*	–	*17.63*	*16.83*	–
9X	*4.46*	*8.29**	*0.025**	*2.00*	*3.21*	–*
9	51.96	65.00	–*	19.33	19.50	–*
10S	*12.25*	*14.96*	*0.025*	*8.79*	*9.75*	–
10C	*7.04*	*7.17*	–	*3.88*	*3.54*	–
10	19.29	22.13	–	12.42	12.92	–
TTR	0.52	0.45	0.025*	–	–	–
PTR	0.39	0.44	–*	–	–	–
SCR	0.10	0.11	–	–	–	–
SSR	0.55	0.58	–	–	–	–
IDR	0.67	0.70	–*	0.61	0.63	–*
TRR	0.94	0.96	–*	–	–	–
TRR89	0.98	0.98	–	–	–	–
CCR	0.43	0.39	–	–	–	–
TQR	0.51	0.55	–	–	–	–
TQR89	0.57	0.61	–	–	–	–
PSSR	0.59	0.62	–	–	–	–
PIR	0.63	0.64	–*	–	–	–
3U/3	0.58	0.49	0.05*	0.48	0.39	0.05*
4B/4N+4B	0.47	0.49	–*	0.44	0.44	–*
Cell(3-3)/3	0.37	0.33	–*	–	–	–

For the definition of the categories and ratios, see appendix.

– two-tail test
* one-tail test

Table 4b

Effects of IA Training and Feedback Based on IA in Regular Classrooms

Means and Wilcoxon-Test Results for the Number and Length of Student Utterances ("Teacher Response Lesson")

Variables	Pretest M	Posttest M	p
Number of student utterances	32.96	32.04	–
Length of student utterances	2.83	2.82	–
Number of long student utterances (3 3-Second-Units and more)	0.34	0.40	–

two-tail test

asked to conduct it as a Teacher Response Lesson (TRL) (see Study 1 of set 2), a classroom discussion oriented towards the objectives of Lesson 1 of Minicourse 4. They were selected because the behaviors of category 3 are appropriate for discussion and interaction in peer teaching situations as well as in classrooms with pupils (Flanders, 1970; Gage, 1979). A synopsis of these objectives had been distributed prior to the course (as in Study 2 of set 2). This was done in order to make sure changes did not occur only because the participants did not know exactly what to do in the pretest (Borg et al., 1970). Both the experimental and the comparison group then completed Lesson 1 of Minicourse 4 and analyzed their own pretest videotapes. This required 2 days altogether . They then worked through an expanded version of Lesson 4 of Minicourse 4. By advocating more indirect methods (IDR, TRR) and broad questions (4 B), emphasis is placed on accepting and using discussion members' ideas, particularly using these ideas (3 U) rather than merely accepting them. The Lesson also stressed the desirability of reducing moderator talk (TTR) and increasing discussion members talk (PTR), particularly increasing initiated talk of discussion members (PIR, category 9).

The experimental group went through one Microteaching cycle in a peer teaching situation. This consisted of a 10-15 minute teach, feedback based on the videotape and on Flanders' IA system expanded specifically according to the training objectives, group feedback, reteach, and again feedback as for the teach. The comparison group only discussed the course objectives informally in small groups. For this group the course ended one day earlier than for the experimental group.

Both the experimental group and the comparison group taught a posttest TRL microlesson under the same conditions as the pretest.

This study was conducted as a one-week Microteaching clinic of approximately 30 hours altogether.

Study 2

Method

Study 2 was conducted within a regular nine-week semester course at the University of Tuebingen (1). The training provided in this course was the same as that provided for the experimental group of Study 1. Due to organizational and technical problems, the Microteaching sessions could only be done in an abbreviated form.

The group consisted of 11 university students specializing in education. Most of them were postgraduates and had had teaching experience. Seven of them were experienced teachers returning to the university for advanced education.

Data source for Study 1 and Study 2

The evaluation was carried out with Flanders' IA categories divided for this purpose into 17 sub-categories. The first 10 minutes of each pre- and post-discussion were coded by trained observers. Inter-rater reliability was above 0.85. The coded segment of each lesson contained approximately 200 observations, which served as raw data for the pre-post comparison with the Wilcoxon-test. In Study 1, the U-test was used for determining the difference in change between the experimental and the comparison group.

Results

Tables 5a-c summarize the results for Studies 1 and 2.

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(1) This Study was additionally evaluated in the senior thesis of S. Schneider and C.R. Weisbach. Tübingen 1975 (mimeo).

Table 5a:

IA Training, Feedback Based on IA and One Microteaching Cycle

Means, Wilcoxon- and U-Test Results for the Basic IA Categories and 7 Subcategories in Units and Chains("Teacher Response Lesson")

		Study 1								Study 2					
		experimental group (n=11)				comparison group (n=10)				(1)		(n=11)			
cat.	test	units M	W-Test p	chains M	W-Test p	units M	W-Test p	chains M	W-Test p	units U-Test	chains U-Test	units M	W-Test p	chains M	W-Test p
1	pre	0.00	–	0.00	–	0.00	–	0.00	–	–	–	0.09	–	0.09	–
	post	0.00		0.00		0.00									
2	pre	0.27	–	0.27	–	0.30	–	0.30	–	–	–	0.36	–	0.36	–
	post	0.27		0.27		0.60		0.60				0.00		0.00	
3A	pre	4.82	–	4.46	–	7.70	–	7.60	–	–	–	7.64	–	7.55	–
	post	5.64		5.46		8.10		7.90				7.00		6.91	
3U	pre	4.45	0.005*	1.73	0.005*	2.60	0.005*	1.50	0.005*	0.05	–	7.45	–	4.18	–*
	post	11.18		4.18		6.40		3.40				9.38		5.18	
3	pre	9.27	0.025*	5.91	–**	10.30	0.01*	8.90	–*	–	–	15.09	–*	10.46	–*
	post	16.82		8.09		14.50		10.20				16.36		10.91	
4N	pre	2.73	nearly* sign.	1.55	–	0.70	0.05	0.60	–	0.02	–	2.45	–	2.36	–*
	post	0.55		0.55		1.70		1.40				1.09		0.82	
4B	pre	5.18	–*	1.82	–*	9.00	–*	3.60	–**	–	–	6.09	–	2.73	–*
	post	5.73		2.18		8.30		2.90				5.00		1.91	
4	pre	7.91	–	3.36	–	9.70	–	4.20	–	–	–	8.55	–	5.09	0.10
	post	6.27		2.73		8.00		4.20				6.09		2.73	
5	pre	67.91	0.01	7.82	–	44.60	–	11.60	–	0.02	–	44.91	nearly sign. 0.10	11.18	–
	post	33.18		5.46		46.90		11.60				29.00		7.09	
6	pre	0.18	–	0.18	–	1.10	–	0.70	–	–	–	0.64	–	0.55	–
	post	0.18		0.09		0.50		0.50				1.27		0.64	
7	pre	0.09	–	0.09	–	2.60	–	2.40	–	–	–	2.27	–	1.73	–
	post	0.36		0.27		3.60		2.50				0.45		0.46	
8A	pre	10.91	–	4.91	–	4.30	–	4.10	–	–	–	4.91	–	4.82	–
	post	4.82		4.18		4.20		3.90				3.64		3.55	
8	pre	12.27	–	6.27	–	10.20	–	9.80	–	–	–	8.55	–	8.55	–
	post	6.64		5.91		8.40		8.00				9.09		8.73	
9A	pre	3.27	–	2.91	–	1.80	–	1.80	–	–	–	0.55	–	0.55	0.10
	post	2.27		2.09		0.90		0.90				1.64		1.64	
9U	pre	2.36	0.05*	1.46	–*	4.30	–*	2.00	–*	–	–	1.82	0.05*	1.36	0.05*
	post	8.45		2.64		7.00		3.20				3.00		2.09	
9	pre	84.73	0.005*	17.09	–*	100.0	–*	26.70	–*	0.05	–	103.27	0.05*	22.91	–**
	post	124.0		18.73		103.2		25.10				122.36		22.82	
10	pre	1.73	–	1.46	–	5.80	–	4.10	–	–	–	5.64	–	4.73	–
	post	2.55		2.18		4.80		4.70				4.00		3.64	

* one-tail test
two-tail test

For the definition of categories and subcategories, see appendix.

(1) Test for the significance of differences between the experimental group and the control group.

Table 5b:

IA Training, Feedback Based on IA and One Microteaching Cycle

Means, Wilcoxon- and U-Test Results for 15 Ratios (calculated in units and chains) ("Teacher Response Lesson")

		Study 1								Study 2			
		experimental group (n=11)				comparison group (n=10)				(1)		(n=11)			
Ratio	test	units M	W-Test p	chains M	W-Test p	units M	W-Test p	chains M	W-Test p	units U-Test	chains p	units M	W-Test p	chains M	W-Test p
TTR	pre post	0.46 0.30	0.005*	–	–	0.37 0.39	–	–	–	0.02	–	0.38 0.28	0.025*	–	–
PTR	pre post	0.53 0.69	0.005*	–	–	0.60 0.59	–	–	–	0.05	–	0.59 0.70	0.025*	–	–
SCR	pre post	0.01 0.01	–	–	–	0.03 0.03	–	–	–	–	–	0.03 0.02	–	–	–
SSR	pre post	0.82 0.82	–	–	–	0.69 0.68	–	–	–	–	–	0.69 0.74	–	–	–
IDR	pre post	0.25 0.44	0.01*	0.46 0.63	0.025	0.27 0.31	–	0.41 0.45	–	0.05	nearly sign. 0.10	0.37 0.44	–	0.52 0.59	–
TRR	pre post	0.95 0.97	–	–	–	0.67 0.81	–	–	–	–	–	0.86 0.93	–	–	–
TRR89	pre post	0.95 0.98	–	–	–	0.80 0.83	–	–	–	–	–	0.89 0.97	–	–	–
CCR	pre post	0.45 0.24	0.01	–	–	0.36 0.36	–	–	–	0.02	–	0.34 0.23	0.10	–	–
TQR	pre post	0.14 0.18	–	–	–	0.16 0.15	–	–	–	–	–	0.18 0.21	–	–	–
TQR89	pre post	0.22 0.23	–	–	–	0.06 0.26	nearly sign.	–	–	–	–	0.13 0.18	–	–	–
PSSR	pre post	0.83 0.86	–	–	–	0.74 0.75	–	–	–	–	–	0.75 0.81	–	–	–
PIR	pre post	0.85 0.94	nearly sign.*	–	–	0.90 0.92	–	–	–	–	–	0.91 0.93	–	–	–
3U/3	pre post	0.38 0.65	0.01*	0.25 0.47	0.025*	0.19 0.50	0.025*	0.14 0.36	0.025*	–	–	0.46 0.55	–	0.36 0.45	–
4B/4	pre post	0.71 0.74	–	0.66 0.69	–	0.84 0.74	–	0.78 0.70	–	–	–	0.69 0.86	–	0.63 0.80	–
9U/9	pre post	0.02 0.09	0.025*	0.06 0.11	–	0.04 0.06	–	0.07 0.11	–	–	–	0.02 0.03	–	0.06 0.08	–
Cell 3-3/3	pre post	0.30 0.49	0.05*	–	–	0.10 0.34	0.02*	–	–	–	–	0.26 0.33	–	–	–

* one-tail test
two-tail test

For the description of the Ratios, see appendix.

(1) Test for the significance of differences between the experimental group and the control group.

Table 5c

Effects of IA Training, Feedback Based on IA and One Microteaching Cycle

Means, Wilcoxon-, and U-Test Results for the Number and Length of Discussion Member's Utterances ("Teacher Response Lesson")

		Study 1					Study 2	
Variables	test	experimental group W-Test (n=11)		comparison group W-Test (n=10)		(1) U-Test	(n=11) W-Test	
		M	p	M	p	p	M	p
number of disc. memb. utterances	pre post	22.27 22.91	–	33.50 29.90	–	–	29.09 27.00	–
length of disc. memb. utterances	pre post	4.56 6.22	0.02	3.62 3.85	–	0.10	4.15 5.07	–
number of long discussion members' utterances (3 3-second units and more)	pre post	0.53 0.64	0.10	0.43 0.56	0.02	–	0.48 0.60	–

two-tail test

(1) Test for the significance of differences between the experimental group and the control group.

Tables 5a-c show for both the experimental and the comparison group of Study 1 a significant gain in the use of discussion members ideas (3U in chains and units and the ratio 3U/3), in all category 3 behaviors (units), in the sustained use of these behaviors (3-3 cells / 3), and in the number of long contributions of discussion members (cat. 9, see table 5c). In contrast to the significant increase of narrow questions in the comparison group, the experimental group reveals a decrease (almost significant) in this variable, as well as a significant decrease of the discussion moderator talk (TTR) and lecturing (cat. 5). A significant increase can be observed in the moderator indirect behaviors (IDR), in discussion members talk (PTR), particularly in initiative behaviors (cat.9), in the length of these statements (table 5c), and in the use of discussion members ideas by their peers (9U). The comparison of change rates of the experimental and the control group were significant in categories 3U, 4N, 5, 9, and [illegible] the Flanders Ratios TTR, PTR, IDR, and CCR. It became almost significant in the length of discussion members utterances.

These results suggest that extensive IA training aiming at very specific behavior (such as this course's objective: using ideas of discussion members) is effective in altering this behavior. For changes beyond these specific behaviors at least some practice proves desirable.

Study 2 corroborates with the results of Study1, but the trend is not as evident. The changes are in the same direction but became significant only in the variables: reduction of moderator talk (TTR), increase in discussion members talk (PTR), especially initiative talk (cat. 9 behaviors), and in discussion members use of their peers' ideas (9U). Due to their background and prior teaching practice most of the participants started with better baseline data than the Study 1 group; they were

obviously better able to realize the behaviors in question by simply reading the information they obtained prior to the pretest. In addition, the course effects seem to have been reduced by the training format (one 90-minute session every week) and by scheduling problems.

THE FOURTH SET OF STUDIES

The results of the set 2 and set 3 studies suggest that training in coding IA categories and feedback based on interaction analysis may be considered a prerequisite for changing teacher behavior, particularly in regard to very specific and perhaps simple skills. However, it does not seem to be effective without supplementary methods such as Microteaching, especially in the case of beginning teachers.

We conducted two further studies to determine whether the entire Minicourse 4 was more effective than the type of treatment described in sets 2 and 3. This attempt was made even though this long a training program might be difficult to implement into the West German teacher training curriculum without reducing other components of the curriculum.

Method

Sixteen student teachers of different subject matters (Study 1) and fourteen secondary school teachers with extensive training in education and many years of teaching experience (Study 2) volunteered to take the entire Minicourse 4. This Minicourse aims at four sets of communication skills (see table 1) to be trained in four micro-teaching cycles consisting of: 10-15 minute teach, videotape or audiotape feedback, reteach, videotape or audiotape feedback. The participants in Study 1 were trained in an intensive course of fourteen and one-half days (6-8 hours daily), while the inservice teachers in Study 2 were allowed to organize their training individually over a two-month period at their schools. In Study 1, the four Microteaching cycles were set up in a peer teaching format with videotape feedback and IA. Study 2 used actual pupils and audiotape feedback.

For the same reasons as described in set 3, all participants received the objectives of the training and a description of the teaching skills prior to their pretests. These pretests were conducted as described in Study 1 of set 1. The participants were first asked to conduct a Teacher Initiation Lesson (TIL) with one group and then a Teacher Response Lesson with a different group (TRL). The groups in Study 1 consisted of 5 - 6 peers, and the groups in Study 2 consisted of 5 - 6 pupils in the teachers' own classes.

Data source

Two independent trained observers coded 8.5 minutes (Study 1) and 10 minutes (Study 2) of each pre- and posttest with the expanded IA system subdivided according to the training objectives. Observer reliability was above .80. Since it was coded in three-second intervalls, the coded segment of each lesson contained approximately 170 observations (Study 1) or 200 observations (Study 2), which served as raw data for the Wilcoxon-tests.

Results

Tables 6 a-e summarize the results of Studies 1 and 2.

The results show that nearly all the specific objectives of the Minicourse were achieved (tables 6d and e). The use of student ideas beyond simple acknowledgement (3U/3), sustained acceptance (3-3/3), the use of broad rather than narrow questions, the provision of reasons in conjunction with praise and criticism ("because extensions"), and the number of student-student interactions and student-initiated questions (as suggested by Lesson 5 of the Minicourse) increased, though not in all cases significantly. Virtually no changes occurred with behaviors seldom present in classroom and other interaction processes: in category 1 (teacher accepts feelings), in category 6 (subscripted), and in categories 2 and 3 in conjunction with category 7 (praise or accepting ideas when criticizing).

Table 6a

Effects of IA Training, Feedback Based on IA and Extended Practice in a Microteaching Format (4 MT-Cycles)

Means and Wilcoxon-Test Results for the 10 Basic IA-Categories (Study 1 Based on 8,5 Minutes, Study 2 Based on 10 Minutes)

		Study 1								Study 2							
		Test 1 (n=16) TIL				Test 2 (n=16) TRL				Test 1 (n=14) TIL				Test 2 (n=14) TRL			
Cat.	test	units M	W-Test p	chains M	W-Test p	units M	W-Test p	chains M	W-Test p	units M	W-Test p	chains M	W-Test p	units M	W-Test p	chains M	W-Test p
1	pre	0.00	_*	0.00	_*	0.00	_*	0.00	_*	0.29	_*	0.29	–	0.07	_*	0.07	_*
	post	0.38		0.25		0.56		0.50		1.00		1.00		0.07		0.07	
2	pre	0.81	0.025*	0.63	0.05*	1.31	0.05*	1.25	_*	11.71	_*	11.57	_*	10.00	_*	9.71	_*
	post	3.63		2.06		2.81		1.69		9.64		8.79		9.43		8.50	
3	pre	7.38	0.005*	5.06	0.005*	14.44	0.01*	11.25	–	27.00	_*	20.00	_*	27.93	_*	20.71	_*
	post	19.81		11.06		22.69		13.06		31.07		20.00		31.43		18.36	
4	pre	3.81	0.01	2.06	0.01	9.75	–	5.25	–	26.21	0.10	16.86	0.05	23.21	0.10	15.63	0.05
	post	9.88		5.69		8.31		5.06		18.71		12.14		18.36		11.57	
5	pre	122.06	0.01	8.38	0.10	56.06	0.01	10.88	0.01	44.07	–	9.29	–	27.50	0.10	7.43	–
	post	56.06		10.88		31.69		8.38		37.86		6.71		17.00		5.50	
6	pre	0.69	0.05	0.38	0.02	0.75	–	0.50	–	2.36	–	2.07	–	2.71	–	2.43	–
	post	2.50		1.25		0.94		0.56		1.57		1.29		1.43		0.86	
7	pre	1.56	–	1.19	–	2.00	–	1.50	–	1.79	–	1.71	–	2.29	–	1.64	–
	post	2.69		1.81		3.13		2.19		1.14		0.93		1.43		1.14	
8	pre	3.94	–	1.75	0.05	7.00	0.10	3.38	–	38.64	0.01	26.86	0.01	29.29	0.01	20.64	0.01
	post	6.56		4.94		4.63		2.88		19.14		14.79		8.86		7.07	
9	pre	22.81	0.005*	7.13	0.005*	72.81	0.005*	22.25	0.005*	33.29	0.005*	17.43	0.025*	61.57	0.005	27.14	0.05*
	post	62.88		22.06		93.63		31.31		65.00		28.36		98.71		36.07	
10	pre	8.00	–	4.88	–	4.00	–	2.69	–	15.57	–	12.57	–	16.43	–	12.21	–
	post	7.06		3.81		3.00		2.56		15.71		12.43		14.36		11.21	

– two-tail test
* one-tail test

TIL = Teacher Initiation Lesson
TRL = Teacher Response Lesson

For the description of the categories, see appendix.

Table 6b

Effects of IA Training, Feedback Based on IA and Extended Practice in a Microteaching Format

Means and Wilcoxon-Test Results for 12 Flanders Ratios

		Study 1				Study 2			
Ratio	Test	TIL M	W-Test p	TRL M	W-Test p	TIL M	W-Test p	TRL M	W-Test p
TTR	pre post	0.80 0.56	0.005*	0.51 0.41	0.005*	0.57 0.50	0.025*	0.47 0.39	0.025*
PTR	pre post	0.16 0.40	0.005*	0.47 0.57	0.005*	0.36 0.42	0.05*	0.45 0.54	0.05*
SCR	pre post	0.05 0.04	–	0.02 0.02	–	0.08 0.08	–	0.08 0.07	–
SSR	pre post	0.83 0.69	0.01	0.70 0.68	–	0.44 0.51	0.02	0.47 0.56	–
IDR	pre post	0.09 0.38	0.005*	0.32 0.51	0.005*	0.61 0.67	–*	0.66 0.78	0.05*
TRR	pre post	0.73 0.83	–*	0.85 0.85	–*	0.84 0.88	–*	0.90 0.94	–*
TRR89	pre post	0.82 0.89	–*	0.90 0.88	–*	0.87 0.89	–*	0.94 0.94	–*
CCR	pre post	0.79 0.46	0.01	0.47 0.30	0.01	0.46 0.36	0.05	0.35 0.25	0.05
TQR	pre post	0.04 0.19	0.01	0.16 0.23	–	0.44 0.46	–	0.49 0.58	–
TQR89	pre post	0.07 0.25	–	0.18 0.28	–	0.57 0.43	–	0.51 0.56	–
PSSR	pre post	0.60 0.71	–	0.74 0.77	–	0.42 0.51	0.01	0.53 0.66	0.05
PIR	pre post	0.77 0.87	–*	0.87 0.94	0.025*	0.38 0.70	0.005*	0.60 0.88	0.005*

– two-tail test

* one-tail test

TIL = Teacher Initiation Lesson
TRL = Teacher Response Lesson

For the definitions of the Ratios, see appendix.

Table 6c

Effects of IA Training, Feedback Based on IA and Extended Practice in a Microteaching Format

Means and Wilcoxon-Test Results for Number and Length of Pupil Utterances.

		Study 1				Study 2			
		(n=16)				(n=14)			
Var.	test	TIL M	W-Test p*	TRL M	W-Test p*	TIL M	W-Test p	TRL M	W-Test p
Number of pupil utterances	pre post	8.75 26.69	0.01	25.25 34.06	0.01	42.86 40.71	–	46.07 42.29	
Length of pupil utterances	pre post	2.96 2.73	–	3.29 3.11	–	1.55 1.94	0.01	1.98 2.69	0.01
Number of long pupil utterances (3 3-sec. units and more)	pre post	0.43 0.34	–	0.38 0.40	–	0.15 0.23	0.01	0.21 0.37	0.01

*two-tail test

Table 6d

Effects of IA Training, Feedback Based on IA and Extended Practice in a Microteaching Format

Means and Wilcoxon-Test Results for 10 Subcategories

		Study 1								Study 2							
		TIL				TRL				TIL				TRL			
Cat.	test	units M	W-Test p	chains M	W-Test p	units M	W-Test p	chains M	W-Test p	units M	W-Test p	chains M	W-Test p	units M	W-Test p	chains M	W-Test p
2B	pre	0.00	0.05	0.00	0.05	0.00	–	0.00	–	0.64	0.025	0.64	0.025	1.14	0.005	1.00	0.005
	post	1.25		0.75		0.81		0.44		2.21		2.00		2.71		2.64	
3A	pre	4.31	–	3.63	0.05	8.00	–	7.31	–	14.36	0.005	12.64	0.005	14.14	0.005	12.57	0.005
	post	6.25		5.81		6.94		6.25		6.79		6.79		6.64		6.21	
3U	pre	3.06	0.005	1.81	0.005	6.44	0.005	4.25	0.01	12.64	0.005	9.71	0.025	13.79	0.01	10.64	–
	post	13.56		5.81		15.75		8.19		24.29		15.29		24.79		14.43	
4O	pre	–	–	–	–	–	–	–	–	6.07	0.10*	6.07	0.10*	5.36	0.02*	5.36	0.02*
	post									3.43		3.43		3.00		3.00	
4N	pre	1.75	–	1.00	0.05	3.88	–	2.63	–	14.43	0.005	9.64	0.01	9.71	0.005	7.14	0.01
	post	3.50		2.63		2.75		1.81		5.36		4.21		2.93		2.50	
4B	pre	2.06	0.005	1.06	0.005	5.88	–	3.06	–	5.71	nearly sign.	3.21	0.025	8.14	nearly sign.	4.36	0.05
	post	6.38		3.06		5.56		3.38		9.93		5.57		12.43		6.86	
6B	pre	0.38	–	0.19	–	0.00	–	0.00	–	0.00	–	0.00	–	0.00	–	0.00	–
	post	1.00		0.25		0.19		0.13		0.50		0.43		0.50		0.29	
7B	pre	1.44	0.05	0.13	0.05	0.44	–	0.31	nearly sign.	0.57	–	0.57	–	0.64	–	0.05	–
	post	0.94		0.69		1.06		0.94		0.64		0.57		0.93		0.86	
9X	pre	(not calculated)								3.71	0.01	3.07	0.025	6.43	0.01	5.14	–
	post									9.36		5.93		15.36		7.50	
9Q	pre	(not calculated)								0.64	nearly sign.	0.57	nearly sign.	1.93	–	1.07	–
	post									2.21		1.71		2.07		1.43	

– one-tail test
* two-tail test

For the definitions of the categories, see appendix.

Table 6e

Effects of IA Training, Feedback Based on IA and Extended Practice in a Microteaching Format

Means and Wilcoxon-Test Results for Ratios Directly Related to the Course Objectives.

		Study 1								Study 2							
		TIL (n=16)				TRL (n=16)				TIL (n=14)				TRL (n=14)			
Ratio	test	units M	W-Test p	chains M	W-Test p	units M	W-Test p	chains M	W-Test p	units M	W-Test p	chains M	W-Test p	units M	W-Test p	chains M	W-Test p
$\frac{2B}{2}$	pre	0.00	0.05	0.00	0.05	0.00	nearly sign.	0.00	nearly sign.	0.06	0.025	0.06	0.05	0.10	0.005	0.06	0.05
	post	0.11		0.09		0.13		0.10		0.26		0.25		0.36		0.25	
$\frac{3U}{3}$	pre	0.40	0.05	0.35	0.05	0.42	0.005	0.36	0.005	0.44	0.005	0.41	0.005	0.51	0.005	0.41	0.005
	post	0.64		0.50		0.70		0.60		0.72		0.65		0.82		0.65	
$\frac{4B}{4} \mid \frac{4B}{4N+4B}$	pre	0.48	–	0.48	–	0.37	–	0.52	0.05	0.30	0.005	0.29	0.005	0.50	0.01	0.46	0.005
	post	0.62		0.57		0.27		0.67		0.63		0.60		0.85		0.84	
$\frac{6B}{6}$	pre	0.04	–	0.04	–	0.00	–	0.00	–	0.00	–	0.00	–	0.00	–	0.00	–
	post	0.14		0.09		0.07		0.06		0.11		0.11		0.14		0.11	
$\frac{7B}{7}$	pre	0.02	0.01	0.03	0.01	0.12	–	0.13	–	0.13	–	0.13	–	0.17	–	0.13	–
	post	0.25		0.23		0.19		0.18		0.23		0.23		0.36		0.23	
$\frac{9X}{9}$	pre	–	–	–	–	–	–	–	–	0.07	0.05	0.10	0.025	0.09	0.05	0.10	0.025
	post									0.13		0.16		0.13		0.16	
$\frac{9Q}{9}$	pre	–	–	–	–	–	–	–	–	0.02	–	0.02	0.025	0.06	–	0.02	0.025
	post									0.04		0.05		0.02		0.05	
Cell (1-7) + (7-1) + (2-7) + (7-2) (3-7) + (7-3) div. Cat. 7	pre	0.06	nearly sign.	–	–	0.12	–	–	–	0.29	–	–	–	0.12	–	–	–
	post	0.23				0.12				0.11				0.08			
Cell $(\frac{3-3}{3})$	pre	0.20	0.05	–	–	0.20	0.025	–	–	0.22	0.01	–	–	0.22	0.005	–	–
	post	0.36				0.36				0.31				0.41			

one-tail test

Furthermore, there is a significant decrease in teacher talk (TTR) in the TIL as well as in the TRL for both studies. The student teachers and the inservice teachers changed their teaching style towards a more indirect influence by reducing lecturing (category 5, significant in Study 1 with the TIL and TRL, almost significant with the TRL in Study 2) and/or increasing behaviors of categories 2, 3, and 4 (significant in the TIL and TRL of Study 1). In connection with this, the IDR increased (significantly in both studies with both types of tests, except for the TIL in Study 2), and the CCR decreased significantly in both studies.

As a consequence of the training based on the entire Minicourse 4, student behavior changed considerably. The percentage of pupil talk (PTR) and student initiation (category 9 and PIR) increased significantly in both studies. While in Study 1 (peer teaching) the number of peer utterances increased significantly, the student utterances in Study 2 became significantly longer and the number of long utterances (PSSR and the variable in table 6e) increased significantly when calculated as chains). So did teacher questions: the teachers in Study 1 switched to a more interactive style. In the TRL and in Study 2, however, where the teachers started with a relatively high frequency of questions and pupil reactions, both kinds of behaviors decreased significantly.

Questionnaire and interview data were assessed in the third and fourth set of studies. These data indicate that the course goals and training methods were well-accepted by the participants.

DISCUSSION

As is widely assumed, training beginning teachers or inservice teachers in the skill of classroom observation is basic to program development in teacher education. As stated earlier, "to produce an alert teacher is to make him aware of the behaviors involved in teaching and to help him acquire a conceptual system for interpreting them." (Smith, 1970, p.55). The set 1 studies showed that training in IA coding can lead to an acceptable level of accuracy in a relatively short time. This finding is consistent with results of previous research (Langer/Allen, 1970; Lai et al., 1973; Brusling/Tingsell, 1973).

But does training in systematic observation lead to desired changes?

A considerable number of studies which indicate that merely knowing specific concepts of teaching behavior is not sufficient for inducing changes in teacher classroom behavior (Flanders, 1963; Ranson, 1969; Luebkemann, 1966; Tuckman et al., 1969; cf. Peck and Tucker, 1973). Nearly twenty studies clearly demonstrate the effects of training in systematic observation when accompanied by some kind of a practice (see the reports of these studies with Flanders, 1970; Peck and Tucker, 1973; and Amidon and Hough, 1967; Orme, 1966; K.E. Claus, 1969). Furthermore, a number of studies indicate that observer training or providing focus by specific instructions on the behaviors to be learned, plus some type of practical experience is more effective than observer training alone.(e.g. Morse and Davis, 1970; Davis and Smoot, 1969; Reed et al., 1970; Chavers et al., 1970; Nuthall, 1976; Veenman et al., 1974; Acheson and Zigler, 1971; Gall et al., 1974; Langer and Allen, 1973).

Another group of studies found that training in coding classroom interaction supplemented by Microteaching practice was no more effective than (a) only providing training in coding classroom interaction, or (b) simply providing instruction on the behaviors to be learned (Borg et al., 1969; Pancrazio and Johnson, 1971). Or it indicated that the practice element of Microteaching was less effective than discrimination training (Wagner 1973, 1976). In the study of Borg et al. (1969), for a number of problems that arose in conducting the Microteaching training, the treatment differences between the groups having the full Microteaching practice and those with no Microteaching practice were not large enough to result in performance differences. The same is true for the Pancrazio and Johnson study because the treatment differences only consisted of one 10-minute Microteaching session and an unsupervised videotape playback. The study of Wagner compared the effects of one Microteaching cycle without discrimination training with discrimination training without practice. The discrimination training without practice proved superior to the Microteaching practice. But the MT group know only roughly what specific behavior to concentrate on; and the learning effect was assessed only in a situation with roleplaying peers.

Sets 2 and 3 of our studies support the significance of discrimination training, i.e. providing focus in the form of training of systematic observation plus carefully designed practice in a scaled-down teaching situation with specific feedback.

Extended practice, as provided in the set 4 studies, produced the best results. Nearly all objectives of the training were accomplished. The results of the set 4 studies are consistent with results of the Microteaching method when it was tried out with all its components (discrimination training, practice in a

scaled-down situation and specific feedback) at Stanford University (Allen ed., 1967), the Far West Laboratory for Educational Research and Development (Borg et al., 1970), or in other countries (i.e. Turney et al., 1973; van Houten, 1975; Perlberg et al., 1976; Perrott, 1977; Klinzing-Eurich/Klinzing, 1979, 1980, 1981). They remind us that there are effective methods for a practice-oriented teacher training. They can be applied to facilitating the learning of teacher behaviors.

All studies reported here were conducted within courses at the university or other teacher training institutions. Special care was taken that the experimental procedures did not hinder the work of the trainees. Therefore, it was not always possible to use experimental-control group designs or to sample randomly from defined a population across successive studies. To achieve greater confidence in the overall outcome, a (quasi) replication of each study was attempted. We will proceed similarly in the future, as a small team with relatively limited resources attempting to contribute a little to the existing body of knowledge in basic elements of teacher training as well as teacher training methods by combining our research with our obligation to actually teach student teachers or teachers.

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APPENDICES

Appendix 1

Flanders' Interaction Analysis Categories (X)

Teacher Talk	Response	1. Accepts feeling. Accepts and clarifies an attitude or the feeling tone of a student in a nonthreatening manner. Feelings may be positive or negative. Predicting and recalling feelings are included. 2. Praises or encourages. Praises or encourages students; says "um hum" or "go on"; makes jokes that release tension, but not at the expense of a student. 3. Accepts or uses ideas of students. Acknowledges student talk. Clarifies, builds on, or asks questions based on student ideas.
		4. Asks questions. Asks questions about content or procedure, based on teacher ideas, with the intent that a student will answer.
	Initiation	5. Lectures. Offers facts or opinions about content or procedures; expresses his own ideas, gives his own explanation, or cites an authority other than a student. 6. Gives directions. Gives directions, commands, or orders to which a student is expected to comply. 7. Criticizes student or justifies authority. Makes statements intended to change student behavior from nonacceptable to acceptable patterns; corrects student answers; bawls someone out. Or, states why the teacher is doing what he is doing; uses extreme self-reference.
Student Talk	Response	8. Student talk -- response. Student talk in response to teacher contact which structures or limits the situation. Freedom to express own ideas is limited.
	Initiation	9. Student talk -- initiation. Students initiate or express own ideas either spontaneously or in response to teacher's soliciting initiation. Freedom to develop opinions and a line of thought; going beyond existing structure.
Silence		10. Silence or confusion. Pauses, short periods of silence, and periods of confusion in which communication cannot be understood by the observer.

(X) There is no scale implied by these numbers. Each number is classificatory; it designates a particular kind of communication event. To write these numbers down during observation is to enumerate, not to judge a position on a scale. Based on Ned A. Flanders, Analyzing Teaching Behavior, 1970 .

Appendix 2

Ratios of the Flanders Interaction Category System

TTR :	Teacher Talk Ratio	cat. 1,2,3,4,5,6,7 / cat. 1,2,3,4,5,6,7,8,9,10
PTR :	Pupil Talk Ratio	cat. 8,9 / cat. 1,2,3,4,5,6,7,8,9,10
SCR :	Silence and Confusion Ratio	cat. 10 / cat. 1,2,3,4,5,6,7,8,9,10
SSR :	Steady State Ratio	cells of the Flanders-matrix 1-1, 2-2, 3-3, 4-4, 5-5, 6-6, 7-7, 8-8, 9-9, 10-10 / cat. 1,2,3,4,5,6,7,8,9,10
IDR :	Indirect/Direct Ratio	cat. 1,2,3,4 / cat. 1,2,3,4,5,6,7
TRR :	Teacher Response Ratio	cat. 1,2,3 / cat. 1,2,3,6,7
TRR89:	Instantanious Teacher Response Ratio	cells of the Flanders-matrix 8-1, 8-2, 8-3, 9-1, 9-2, 9-3 / cells of the Flanders-matrix 8-1, 8-2, 8-3, 8-6, 8-7, 9-1, 9-2, 9-3, 9-6, 9-7
CCR :	Content Cross Ratio	cells of the Flanders-matrix 1-4, 1-5, 2-4, 2-5, 3-4, 3-5, 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7, 4-8, 4-9, 4-10, 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7, 5-8, 5-9, 5-10, 6-4, 6-5, 7-4, 7-5, 8-4, 8-5, 9-4, 9-5, 10-4, 10-5 / cat. 1,2,3,4,5,6,7,8,9,10
TQR :	Teacher Questioning Ratio	cat. 4 / cat. 4,5
TQR89:	Instantanious Teacher Questioning Ratio	cells of Flanders-matrix 8-4, 9-4 / cells of Flanders-matrix 8-4, 8-5, 9-4, 9-5
PSSR:	Pupil Steady State Ratio	cells of the Flanders-matrix 8-8, 9-9 / cat. 8,9
PIR :	Pupil Initiation Ratio	cat. 9 / cat. 8,9

Appendix 3 .

Expanded IA-System for Set 2 of Study 2

	Cat.	Description
Teacher Talk	1	Acceptance of feelings (see appendix 1)
	2	Praise/encouragement (see appendix 1)
	3A	Acknowledgement of students' ideas (hum, repeating or rephrasing)
	3U	Use of students' ideas (analyzing, clarifying, probing, summarizing, relating to prior statements)
	3	Acceptance and use of students' ideas (see appandix 1)
	4O	Questions-managerial (e.g. calling on students)
	4N	Narrow questions
	4B	Broad questions
	4	Asking questions (see appendix 1)
	5	Lecturing (see appendix 1)
	6	Giving directions (see appendix 1)
	7	Criticism (see appendix 1)
Student Talk	8/	Student talk - response to the teacher
	8X	Student talk - response to another student
	8	Student talk - response
	9/	Student talk - initiative to the teacher
	9X	Student talk - initiative to another student
	9	Student talk - initiative (see appendix 1)
	10S	Silence
	10C	Confusion

For the definition of the Flanders Ratios, see appendix 2.

Additional Ratios:

$$\frac{\text{cat. 3U}}{\text{cat. 3}} \qquad \frac{\text{cat. 4B}}{\text{cat. 4N,4B}} \qquad \frac{\text{cell of Flanders-matrix 3-3}}{\text{cat. 3}}$$

In the evaluation it is distinguished between "units" and "chains":

"Units" refers to the single categories of the FIAC system as recorded approximately every three seconds or at change in category.

"Chains" are defined as an uninterrupted sequence of units of the same category. For example: 4B 4B 4B refers to a chain of category 4B or a broad question of approximately 9 seconds. A chain is discontinued through a shift to another category.

The number of student utterances is defined as:

Sum of chains of cat. 8 + 9

The length of student utterances is defined as:

Sum of chains of cat. 8 + cat. 9
Sum of units of cat. 8 + cat. 9

The number of long student utterances is defined as:

Sum of chains of cat.8+cat.9,that are 3 units long or more
Sum of chains of cat.8+cat.9

Appendix 4

Expanded IA-System for Study 1 and Study 2 of Set 3

	Cat.	Description
Discussion Moderator's Talk	1	Acceptance of feelings (see appendix 1)
	2	Praise/encouragement (see appendix 1)
	3A	Acknowledgement of discussion members' ideas (see appendix 3)
	3U	Use of discussion members' ideas (see appendix 3)
	3	Acceptance and use of discussion members' ideas (see appendix 1)
	4N	Narrow questions (see appendix 3)
	4B	Broad questions (see appendix 3)
	4	Questioning (see appendix 1)
	5	Lecturing (see appendix 1)
	6	Giving directions (see appendix 1)
	7	Criticism (see appendix 1)
Discussion Members' Talk	8A	Discussion members' talk - response - acknowledgement of other discussion members' ideas
	8	Discussion members' talk - response (see appendix 1)
	9A	Discussion members' talk - initiative - acknowledgement of other discussion members' ideas
	9U	Discussion members' talk - initiative - use of discussion members' or moderator's ideas
	9	Discussion members' talk - initiative (see appendix 1)
	10	Silence and confusion (see appendix 1)

For the Flanders Ratios see appendix 2.

For additional ratios, the definition of "units" and "chains", and of the number and length of discussion members' utterances and the number of long utterances see appendix 3.

Appendix 5

Expanded FIAC System for Study 1 and 2 of Cluster 4

	Cat.	Description
Teacher or Discussion Moderator's Talk	1	Acceptance of feelings (see appendix 1)
	2B	Reasons provided in conjunction with category 2 ("because"-extension)
	2	Praise/encouragement (see appendix 1)
	3A	Acknowledgement of ideas (see appendix 3)
	3U	Use of ideas (see appendix 3)
	4Q	Questions, managerial (see appendix 3) (Subscripted for study 2 only)
	4N	Narrow questions (see appendix 3)
	4B	Broad questions (see appendix 3)
	4	Questioning (see appendix 1)
	5	Lecturing (see appendix 1)
	6B	Reasons provided in conjunction with cat. 6 ("because"-extension)
	6	Giving directions (see appendix 1)
	7B	Reasons provided in conjunction with cat. 7 ("because"-extension)
	7	Criticism (see appendix 1)
Student or Discussion Members' Talk	8	Student/discussion members' talk - response
	9X	Student/discussion members' talk - initiative - talking to another student or discussion member (see appendix 3)
	9Q	Student/discussion members' initiated question
	9	Student/discussion members' talk - initiative (see appendix 1)
	10	Silence, confusion (see appendix 1)

For the definition of the Flanders Ratios, see appendix 2; for the definition of "units" and "chains", and the variables: number of student utterances, length of student utterances and number of long student utterances, see appendix 3.

Additional Ratios:

$\frac{2B}{2}$ $\frac{3U}{3}$ $\frac{4B}{4}$ (study 1) $\frac{4B}{4B+4N}$ (study 2)

$\frac{6B}{6}$ $\frac{7B}{7}$ $\frac{9X}{9}$ $\frac{9Q}{9}$

cells of the Flanders-matrix $\frac{1\text{-}7 + 7\text{-}1 + 2\text{-}7 + 7\text{-}2 + 3\text{-}7 + 7\text{-}3}{\text{cat.}7}$

cells of the Flanders-matrix $\frac{j\text{-}j}{\text{category } j}$